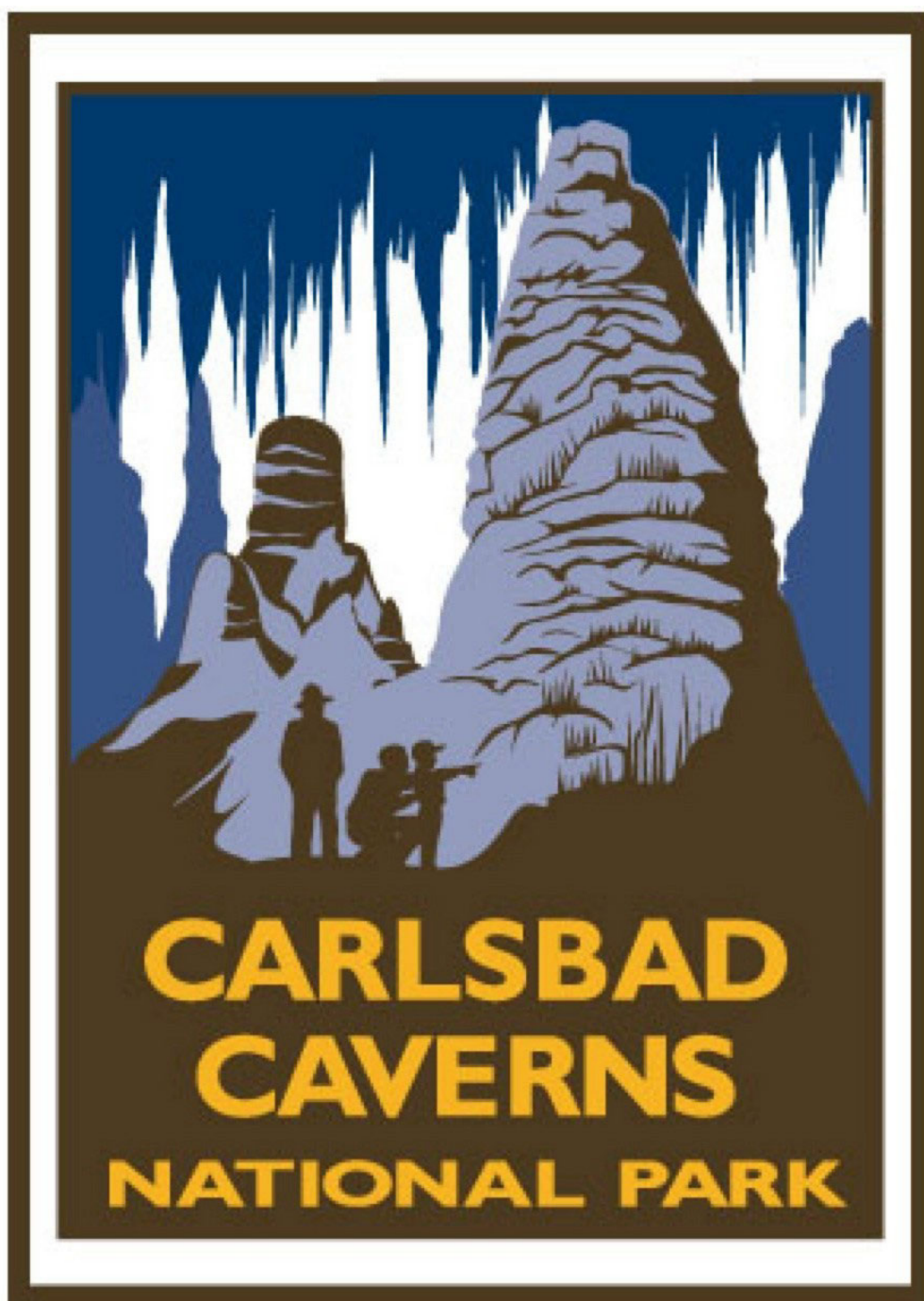




High School Geology



Carlsbad Caverns National Park

High School Geology Curriculum

I. Introduction.....	1
A. Purpose for the curriculum.....	1
B. Explanation of the curriculum format.....	2
C. Fieldtrip information.....	3
II. Lesson Plans.....	4
A. The present is the key to the past: unlocking the geologic history of southeastern New Mexico and west Texas.....	4
B. Putting the puzzle together; internal structure of the Earth and Pangean geography.....	8
1. Activity #1: Earth's internal structure	
2. Activity #2: Earth's external disarray	
3. Activity #3: Puzzle of Pangea	
C. Global building blocks; rocks and mineral identification.....	12
1. Activity #1: Minerals	
2. Activity #2: Rocks and rock cycle	
D. It's not your average Friday night; Relative and absolute dating of geologic materials.....	15
1. Activity #1: Relative dating	
2. Activity #2: Absolute dating	
E. Ocean-front property in New Mexico? Where did the oceans go?	19
1. Activity #1: Climate change; its causes and effects	
2. Activity #2: Tectonics and resulting geologic structures	
F. Bridge over troubled waters: what is an aquifer and how can we protect our groundwater?.....	23
1. Activity #1: Groundwater models and water table gradient	
2. Activity #2: Cave contamination	
3. Hydrology Exercise	
G. This is worse than Swiss cheese! What is karst and why is it important?.....	30
H. Caves... a journey to the center of the Earth	33
I. Perpetually in the dark: Mapping caves	36
1. Activity #1: Mapping caves and recognizing speleothems.	
2. Activity #2: Making your own cave map.	

J. Geology is gneiss, but isn't it outdated? Why understanding geology is important today.....	39
III. New Mexico Science Content Standards and Benchmarks	42
IV. Texas Essential Knowledge and Skills for Science	43
V. Glossary of Terms	50
VI. Curriculum Supplies List	70



Introduction

A. Purpose for the curriculum:

Located in the Guadalupe Mountains on the fringe of the Delaware Basin, a region with unique biologic and geologic features, Carlsbad Caverns National Park has promoted science education through its participation in the National Parks Labs Program with the Chihuahuan Desert Lab (CDL). While the CDL provides projects in biology, botany, hydrology, and GIS technology, both in local high schools and on the internet, none of its projects include geologic investigations. Supported by the National Park Service "Geologist-in-the-Parks" program, a high school level curriculum has been developed emphasizing the regional geology and cavern formation. Built upon the CDL framework, it is our hopes that this curriculum will not only benefit those students in the park's immediate area but also will be available as an online teaching module.

In order to meet this broad student audience, the lessons include field trips to the Permian strata and caverns in conjunction with hands-on, introductory college-style laboratories to provide background geologic concepts. It is through these processes that this curriculum should provide not only an understanding of the regional geology of Carlsbad Caverns National Park, but also a general understanding of geologic history and processes.

B. Explanation of the curriculum format:

The lessons are organized in a format similar to the CDL to maintain recognition of sections and features. This format is:



Title
Grades levels appropriate
Lesson #
Prerequisites
Estimated time
Location

Learner outcomes:

The learner will:

-

Vocabulary:

Background information:

Pre-activity thought questions:

Materials needed:

-

Assessment:

-

Procedure:

The teacher will:

-

Follow-up questions:

Alternative assessments:

-

Bibliography:

Additional reading and other resources:

C. Fieldtrip information:

As geology is best understood when seen in person, fieldtrips to Carlsbad Caverns National Park and Guadalupe Mountains National Park are encouraged. Many of the lessons suggest trips and activities that are done in the cave. However, knowing that fieldtrips are expensive and offering this curriculum via the internet, thus reaching people outside of the area, alternatives to most fieldtrips are offered. These alternatives include use of local geology and National Parks, hands-on laboratory activities, and creative cave-making. A great deal of information about the caverns is also available on the internet at: <http://www.carlsbad.caverns.national-park.com/> and <http://www.nps.gov/cave/>.

Should you be in the area of Carlsbad Caverns National Park and would like to gain the full geology experience this curriculum offers, please contact us in advance at:

Education Specialist
Carlsbad Caverns National Park
3225 National Park Highway
Carlsbad, NM 88220
(505) 785-2232 x432